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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/091,942	03/05/2002	Jing-Horng Gan	JCLA8556	7093

7590

10/16/2003

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EXAMINER

WARREN, MATTHEW E

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 10/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/091,942

Applicant(s)

GAN ET AL. 

Examiner

Matthew E. Warren

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-13 is/are allowed.
- 6) ☒ Claim(s) 1-5, 8 and 9 is/are rejected.
- 7) ☒ Claim(s) 6 and 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

This Office Action is in response to the Election filed on July 25, 2003.

Election/Restrictions

Applicant's election without traverse of Group I, claims 1-13 in Paper No. 3 is acknowledged.

Drawings

Figure 6 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's Prior Art Figure 6 (APAF) in view of Lebowitz (US 4,694,561).

In re claim 1, the APAF 6 shows a variable capacitor structure comprising a substrate (100), a first-type ion-doped well (104) in the substrate and a buried layer

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(102) in the substrate underneath the first type ion-doped well. The first type ion-doped buried layer and the first type ion-doped well are connected. There is a second type ion-doped region (120) at the bottom of the cavity of the first ion-doped well. A conductive layer (28 or 30) is formed over the first type ion-doped buried layer, wherein the conductive layer and the first type ion-doped layer are connected (indirectly through contact with the second type ion-doped region and the first-type ion-doped well). The APAF shows all of the elements of the claims except the first type ion-doped well having a cavity. Lebowitz discloses (col. 1, lines 30-65) that trenches (or cavities) have been formed into substrates as capacitors to achieve specific values of capacitance and increase the density of capacitors in an array. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the variable capacitor of the APAF 6 by forming the capacitor in the bottom of a trench as taught by Lebowitz to achieve high capacitance values increase the density of capacitors in an array.

In re claim 2, the APAF 6 shows a metal silicide over the second type ion region.

In re claim 3, the APAF 6 shows that the conductive layer (30) includes a second type ion doped deep collector region (20).

In re claim 4, the APAF 6 shows a second metal silicide (24) over the second type ion doped deep collector region.

In re claim 5, the APAF 6 shows that the conductor (28) is a contact.

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In re claim 8, the APAF 6 shows that the structure further includes an isolation structure (16) within the first type ion-doped well between the second type ion-doped region (18) and the conductive layer (30).

In re claim 9, the APAF 6, shows that the first type ion-doped buried layer is an N-type buried layer (12) and the second type ion-doped region is a P-doped region (18).

Allowable Subject Matter

Claims 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 10-13 are allowed.

The following is an examiner's statement of reasons for allowance: the prior art references, alone or in combination, do not show a variable capacitor structure comprising a second type ion-doped region in a first type ion-doped well at the bottom of a trench isolation structure and a first conductive layer connected to the first type ion-doped buried layer.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lee et al. (US 6,583,495 B2) , Sparks et al. (US 5,936,164), and Nojiri (JP 3-147375) also disclose variable capacitors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (703) 305-0760. The examiner can normally be reached on Mon-Thurs, and alternating Fri, 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Matthew E. Warren


October 6, 2003